



Portrait of
pizzas
available in Canada
2017



Health
Canada

Santé
Canada



UNIVERSITÉ
LAVAL

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Table of Contents

1. Highlights	4
2. Overview and problematic	6
2.1 Presentation of the pizza sector	6
2.2 Consumption	7
2.3 Nutritional composition	8
2.4 Impact on health	10
2.5 Importance of the information indicated on packaging and marketing	10
2.6 Reformulation of products	11
2.7 Purpose and relevance of the work done by the Observatory	12
3. Objectives	14
4. Methodology	15
4.1 Data pertaining to nutritional composition	15
4.2 Product classifications and definitions	16
4.3 Food purchase data	17
4.4 Database combining nutritional composition and purchases	18
4.5 Statistical analyses	18
5. Results and interpretation of the data	20
5.1 Diversity of pizzas (Objective 1A)	20
5.2 Nutritional composition and sale price (Objective 1B)	21
5.3 Nutritional composition and sale price based on the information presented on the packaging (univariate analyses) (Objective 2A)	28
5.4 Nutritional composition and sale price based on the information presented on the packaging (multivariate analyses) (Objective 2B)	30
5.5 Sales and total contribution of nutrients (Objective 3)	33
6. Discussion	36
7. Conclusion and perspectives	40
8. References	41
9. Appendices	44

1 Highlights

This report presents an overview of the nutritional composition of pizzas offered and sold in Canada in 2017. The pizzas that were analyzed within the context of this study (n=155) represent the majority of all sales on the Canadian pizza market (approximately 80%). This includes frozen and refrigerated pizzas, snack pizzas and frozen calzones. The nutritional composition was evaluated based on the type of pizza (e.g.: deli meats, vegetables, cheese only) and on certain attributes identified through the information that appears on the packaging (e.g.: type of crust, target clientele and specific characteristics). All of these analyses led to a characterization of the nutritional quality of the pizza offer with a view to issuing recommendations aimed at orienting improvement efforts among agri-food industries. The following is a summary of the main results.

An analysis of the offer and sale of pizzas demonstrates the following:

- The widest variety (number of different products offered) is found in the category of pizzas with deli meats and pizzas with vegetables and deli meats. In fact, 31% of all pizzas offered are pizzas with deli meats, followed by pizzas with vegetables and deli meats (23%). Taken together, pizzas with deli meats and pizzas with vegetables and deli meats represent 61% of the sales volume (in kg) of all pizzas.
- The pizza offer includes a larger proportion of products with thin crust (42%), while traditional-crust pizzas represent a larger proportion of sales in kg (49%).
- The large majority of pizzas on the market are made with tomato sauce (88%).
- Most pizzas are targeted to the general population (85% of the offer), while pizzas targeted to children or to a health-conscious clientele represent 14% and 1% of the offer respectively.
- Basic pizzas (i.e.: pizzas with no specific characteristics) make up the largest proportion of the market (73% of the offer), while more than one-quarter (27%) are considered authentic (e.g.: artisanal, baked in a stone oven, old-fashioned).

The study of the nutritional composition and sale price of various types of pizzas demonstrates the following:

- On average, pizzas with deli meats have a higher calorie, fat and sodium content than the other pizzas. Vegetable pizzas have a lower carbohydrate, protein and sodium content compared to the other pizzas. Vegetable pizzas also have a higher sale price than the others.
- More than two-thirds (71%) of all pizzas exceed the 30% daily value threshold for saturated fats, and therefore, may display a nutritional symbol on the front of their packaging. Pizzas with meat and deli meats (100%), vegetable pizzas (80%), cheese pizzas (80%) and pizzas with deli meats only (77%) exceed the 30% threshold most frequently. In addition, 94% of all pizzas exceed the 30% daily value threshold for

sodium, and 85% exceed the voluntary sodium reduction target established by Health Canada. Moreover, all of the largest sellers exceed this target. On the other hand, meat pizzas (n=2/3; 67%) and vegetable pizzas (n=11/25; 44%) respect this target most frequently.

In addition to the type of pizza, the nutritional composition and sale price may differ based on the information displayed on the packaging (e.g.: type of crust, target clientele, specific characteristics):

- Thin-crust pizzas have a higher saturated fat content and lower sugar, sodium and protein content than traditional-crust pizzas. Thin-crust pizzas also have a higher sale price. Calzone pizzas have a higher sugar content compared to traditional-crust pizzas.
- Pizzas targeted to children have a lower saturated fat content and higher fibre content than pizzas targeted to the general population, while their calorie and sodium contents are similar. Pizzas targeted to children are also less expensive than those targeted to the general population for the same reference amount.
- Pizzas that are considered authentic have a lower sugar content compared to basic pizzas (i.e.: pizzas with no specific characteristics) and a similar saturated fat and sodium content.

Annual sales data for the pizza category demonstrate the following:

- Pizzas with deli meats are the most represented among the 50 top sellers.
- The 50 top-selling pizzas represent 32% of the products offered and more than 80% of the total sales of pizzas in dollars.

Summary

The results of this study of pizzas demonstrate a certain degree of variability in terms of nutritional composition based on the various types of products. The variability in the saturated fat and sodium content within each category demonstrates that there is room for improvement with respect to the nutritional value of many products. More specifically, it would be possible to reformulate pizzas with deli meats to reduce the fat and sodium content. In addition, the saturated fat content of thin-crust pizzas should be reduced, whereas traditional-crust pizzas would benefit from a reduction in sodium content. Furthermore, pizzas targeted to children and pizzas that are considered authentic appear to offer better nutritional composition than pizzas targeted to the general population or so-called basic pizzas (pizzas with no specific characteristics).

2 Overview and problematic

The mission of the Food Quality Observatory (the Observatory) is to assess and monitor the evolution of the food supply with a view to generating new knowledge and acting collectively to improve the quality and accessibility of food. Sector studies make it possible to situate the nutritional quality of foods. The objective of the studies conducted by the Observatory is to analyze the nutritional composition of certain food categories and to track its evolution over time. The food categories to be studied are selected based on a rigorous approach. In fact, after consultation with the Observatory's knowledge users, the Scientific Committee prioritizes the food categories to be studied based on four main criteria: health impact, variability of nutritional quality, household penetration rate and potential for product improvement¹. This is the basis on which the pizza category was selected. Therefore, this report presents the results from the analysis of this category.

2.1 Presentation of the pizza sector

Mediterranean populations have been consuming pizza with various toppings for more than a millennium², but pizza only made its appearance in America at the end of the 19th Century². Since that time, pizza has continued to grow in popularity, especially among teens and young adults². There is a wide variety of toppings on the market: cheese, vegetables, pepperoni, meat, etc. The most popular topping consumed by Americans is pepperoni³, while cheese holds down the top spot in Québec⁴. At the beginning of the 2000s, frozen pizzas became the largest category of frozen foods on the market, representing more than 20% of frozen food sales⁵. Frozen pizzas also represent 20% of the entire pizza market, with delivery pizzas being the main competition⁵.

2.2 Consumption

Sales of refrigerated pizzas represented \$7.5 million in Québec in 2018, while sales of frozen pizzas reached \$18 million, an increase of 8.9% compared to 2017⁶. It would appear that frozen pizzas represent a practical solution for consumers. In Québec, retail sales of pizza crusts and dough increased by 115% from 2013-2014 to 2015-2016⁷.

According to the 2004 Canadian Community Health Survey (CCHS), pizza was consumed by 9% of Canadians adults, 13% of children aged 1 to 8 years and 17% of youth between the ages of 9 and 18 on a given day⁸.

There is currently very little specific data pertaining to the consumption of refrigerated or frozen pizzas available in grocery stores. However, whether it is frozen or refrigerated, or whether it comes from fast-food chains, restaurants or grocery stores, the consumption of pizza in general appears to be on the rise on an international scale. A report from *Pizza magazine* reveals that, in 2018, more than 60% of pizza companies around the world increased their sales during the previous year⁹.

Norwegians are the largest consumers of pizza (all sources considered), with an average consumption of 14 kg per person per year¹⁰. Americans hold down second position, with an average of 13 kg per person per year, and Italians come in third, with an average annual consumption of 7.6 kg¹¹. In Canada, more than 40% of the population consumes at least one pizza per week¹⁰.

The taste (greasy and salty), ease of preparation and ease of access of ready-to-eat pizzas may explain their enormous popularity. As a matter of fact, pizza vending machines have been introduced in France, offering hot and ready-to-eat pizzas at any time of the day⁷.

Children and teenagers are greatly affected by this food category. In fact, according to data from the *National Health and Nutrition Examination Survey* (NHANES) in 2009-2010, 20% of American children between the ages of 2 and 11 years and 23% of teenagers aged 12 to 19 had consumed pizza on the day of the survey¹². Among those who reported having consumed pizza, the daily energy intake from pizza was 408 kcal for children and 624 kcal for teenagers, which represents 22% and 26% of their daily energy intake respectively. Pizzas from grocery stores represent 24% of the sources of pizzas for children (2nd most popular source, after fast-food restaurants) and 34% of the sources of pizzas for teenagers (1st source). According to a study conducted in schools

in California, 80% of children surveyed like pizza¹³. 54% of the children surveyed in the study eat pizza at school as least once per week, and 47% reported eating pizza outside of school at least once per week¹³.

2.3 Nutritional composition

However, there is very little specific data pertaining to the nutritional composition of refrigerated and frozen pizzas found in grocery stores, because the literature most often reports results related to pizzas sold in restaurants. This limitation should be taken into consideration in the following section.

Pizza is a composite dish comprising a number of the elements that make up a balanced meal as recommended by Canada's Food Guide (cereal products, sources of protein and vegetables)¹⁴. However, the nutritional composition of this dish is often less than optimal, because it is too high in saturated fats and sodium. The frequent presence of deli meats and cheese may explain this situation. In fact, even though cheese it is an important source of calcium, protein and vitamin A, it is also a significant contributor to the saturated fat and sodium found in pizzas¹⁵.

According to the *Institut national de santé publique du Québec* (INSPQ), data from 2015-2016 demonstrate that small-size retail pizzas were among the 10 leading contributors to sodium intake among Québécois¹⁶. According to the CCHS-2004, pizzas represent 3% of the sodium intake among adults over the age of 18 in Canada, and 5% of the sodium intake among youths aged 9 to 18 years⁸.

In France, the *Observatoire de la qualité de l'alimentation* (OQALI – French Observatory of Food Quality) studied 213 frozen pizzas sold in grocery stores in 2010¹⁷. According to the report, the nutritional composition of the products in this sector is relatively homogenous. The variabilities that were observed were mainly due to the relative presence of the crust. Despite everything, cheese pizzas were higher in fats, saturated fats and protein than the other types of pizzas. Pizzas with deli meats had a higher sodium content than the others, while vegetarian pizzas had slightly lower carbohydrate, protein and sodium contents than the other types of pizzas.

Another study conducted in the United Kingdom revealed that the nutritional composition of retail pizzas varied significantly from one product to the next, which suggests that there are differences from country to country. For example, the Margherita pizzas (i.e.: pizza with tomato sauce, mozzarella and basil) that were studied had a calorie content ranging from 200 to 562 kcal per serving¹⁵. Since these

pizzas were often consumed alone, with no side dishes, none of them met the recommendations of the British Food Standards Agency, which stipulates that a meal should provide at least 600 kcal. More than one-third of the Margherita pizzas listed contained more than 1,000 mg of sodium per 600 kcal serving, with contents ranging from 225 mg to 1,500 mg. It is worth noting that the major proportion of sodium came from the cheese, because Margherita pizzas do not contain meat or deli meats. This wide variation in sodium content among pizzas shows that there is room for improving the nutritional composition by reducing the sodium content. In addition, the amount of fibre in the pizzas that were studied varies from 2 g to 9 g per 600 kcal serving. This amount was mainly linked to the type of flour and the amount of tomato used for the sauce and toppings. None of the 25 pizzas that were analyzed met all of the British Food Standards Agency's criteria for being considered a balanced meal.

In the United States, the consumption of pizza in general represented 7.3% of the daily intake of sodium among youths aged 2 to 18 years in 2007-2008¹⁸, and 6.4% among adults (the majority coming from fast-food chains [3.7%] and grocery stores [1.5%])¹⁹. According to data from the NHANES investigation conducted in the United States in 2005-2006, pizza was the second-leading source of calories (6,7%) and the leading source of saturated fats (11.5%) among children and teenagers aged 2 to 18 years²⁰. Between 2003 and 2010, the global caloric intake originating from pizza decreased by 25% among children¹². In the case of teenagers who consumed pizza, the contribution of calories originating from pizza decreased between 2003 and 2010, but the consumption of pizza increased among the general population. Still in the United States, the sodium content in the most popular thin-crust cheese pizzas increased significantly between 2003 and 2010, and potassium and iron contents increased in most of the pizzas offered by fast-food chains²¹. The addition of potassium sorbate or potassium iodate directly to the crust to improve its texture and shelf life may explain this result, although there doesn't appear to be any explanation for the increase in iron content. Total fat content increased among certain types of pizzas, but decreased among other types²¹.

For information purposes, the average composition of one slice of pizza originating from the three largest American pizza chains contains 325 kcal, 700 mg of sodium, 12 g of total fat and 6 g of saturated fats²². In Australia, the 200 pizzas from fast-food chains that were studied contain an average of 250 kcal, 10 g of fat, 4.8 g of saturated fats, 2.6 g of sugar and 573 mg of sodium per 100 g serving²³. However, data pertaining to the nutritional composition of pizzas sold in grocery stores is limited.

2.4 Impact on health

There is no specific scientific data related to the impact of the consumption of refrigerated or frozen pizzas on health. However, the consumption of pizza in general is associated with higher intakes of saturated fats and sodium among children, and these two nutrients contribute to an increased risk of cardiovascular disease¹².

In addition, the consumption of fast food, which includes pizza, is strongly associated with a higher intake of saturated fats and sodium and a lower intake of vitamins A and C²⁴. The consumption of fast food is also associated with a higher consumption of calories and an elevated body mass index²⁵. In fact, fast foods have a high caloric density, and were found to represent 11.3% of the daily energy intake among American in 2007-2010²⁶.

However, one study observed that pizza may be inversely associated with a risk of cardiovascular disease²⁷ and various cancers of the digestive tract²⁸ among Italians. Nevertheless, the authors also mentioned that pizza represents a general indicator of the Italian diet, which is already associated with protective effects for various diseases. In addition, there does not appear to be any link between the consumption of pizza and the prevalence of hormone-dependant cancer²⁹.

2.5 Importance of the information indicated on packaging and marketing

The information that appears on the front of the packaging may influence consumer selections. In fact, a European study noted that displaying a “healthy” logo on the packaging, displaying the nutritional composition along with a colour code (*multiple traffic light system*) or even displaying the percentage of the daily value of nutrients are useful strategies for helping consumers to select the most nutritious pizzas³⁰. Therefore, the information that appears on the front of the packaging enhances the perception of products as “healthy”. In addition, displaying the nutritional composition with a colour code and displaying the nutritional composition with the percentage of the daily value of nutrients reduces the “healthy” perception of less nutritious options.

According to a report on consumer trends related to pizza (*Pizza Consumer Trend Report*), published in 2016, consumers associate the healthy aspect of a food with its naturalness (i.e.: less processed) and a *clean label* (i.e.: fewer ingredients)³¹. More than half of consumers (58%) liked the fact that there were more pizzerias offering natural-type pizzas. In order to meet this demand, one pizzeria decided to offer only deli meats without nitrites, while another removed all additives from its recipes and a third eliminated artificial flavours and colours. Young consumers also demand more options

for gluten-free pizzas. Vegan cheese represents another new trend for pizzerias to explore, along with spicier varieties of pizzas (Cajun, sriracha, jalapeno, green chili). At the same time, gluten-free and low-fat pizzas are considerably more expensive than traditional pizzas³².

According to a study conducted in Italy, pizzas with organic ingredients were preferred over pizzas with conventional ingredients¹¹. In addition, participants were willing to pay up to 20% more for organic pizzas, and preferred refrigerated pizzas over frozen pizzas. Similar results were observed for other food categories³³.

Advertising for pizzas represents 5% of all food advertising presented during television shows that are popular among Black Americans in the United States³⁴. Pizza Hut was the fourth leading advertiser among food chains in terms of frequency, after McDonald's, Kentucky Fried Chicken and Wendy's. Similarly, fast-food marketing is more frequent on social networks. In fact, Australian researchers have shown that 40% of all advertisements on the University of Sydney's Facebook account are for food or drinks, and pizza is the food that is advertised most frequently³⁵.

2.6 Reformulation of products

Researchers in the United Kingdom studied the idea of reformulating Margherita pizzas in order to meet the nutritional requirements for a meal, without exceeding 30% of the recommended daily intake of saturated fats and sodium¹⁵. Toward this end, they had to reduce the amount of cheese (to remain below the British Food Standards Agency targets for saturated fats), reduce the amount of salt in the dough and sauce, add red peppers to the sauce (to reach vitamin C targets), and finally, integrate whole wheat flour and lyophilized seaweed into the dough (to reach the targets for fibre, iron and vitamin A and increase the amounts of vitamin B12). It was noted that this reformulated pizza had a different appearance, but consumers liked the taste as much as that of the reference pizza.

Another study on the acceptability of a pizza crust with improved nutritional value³⁶ revealed that a thick crust enriched with 10% soy protein isolate and 5% psyllium husks, with hydrogenated fats replaced by canola oil, yielded good results. In addition, the crust contained 1.7 times higher protein content and 1.6 times higher fibre content than the original crust, with no trans fats.

The authors wished to determine whether pizzas with improved nutritional value could be offered at a university in California with the same level of acceptability as the

original versions²². Thin-crust pizzas containing 25% less cheese than the original recipe were as acceptable as the original recipe, while delivering lower levels of calories (-167 kcal), sodium (-320 mg) and saturated fats (-2.8 g).

In the United States, the *Healthier US School Challenge criteria* (HUSSC) issued nutritional criteria for pizzas in schools³⁷. For example, in order to meet the criteria, pizzas must contain a whole-grain flour as the main flour, a maximum of 35% of the calories in the form of fats and 10% in the form of saturated fats, and must contain a maximum of 600 mg of sodium per 150 g serving. By opting for pizzas that meet the HUSSC criteria, young people reduced their daily intake of calories, carbohydrates, fats, saturated fats and sodium, while increasing their intake of fibre, vitamin A and protein. By replacing conventional pizzas with pizzas with improved nutritional value, the nutritious quality of the diet among children and teenagers who consume pizza at school was significantly improved.

Other American authors are interested in determining whether the reformulation of recipes for pizzas offered in grocery stores would be a worthwhile option for improving the diet of American children and teenagers³⁸. Reformulated pizzas, based on the nutritional criteria of Nestlé's nutritional profiling system, had lower contents of calories, sodium and saturated fats. Therefore, by reformulating the pizzas offered so that they meet Nestlé's nutritional criteria, intakes of calories (-14 kcal), saturated fats (-1.2 g) and sodium (-143 mg) would be significantly reduced among consumers of pizzas. Considering the fact that pizza has been classified as one of the main sources of calories for the past two decades, this confirms that the reformulation of pizzas would have a considerable impact on the nutritional intake of young Americans.

In conclusion, the use of whole flour for the crust does not seem to affect the appreciation of pizza among children in a restaurant setting³⁹. Therefore, this may be an avenue to explore with respect to increasing the consumption of whole grains among children, because this element is below recommended levels in the United States (i.e.: half of cereal product servings in the form of whole grains)⁴⁰.

2.7 Purpose and relevance of the work done by the Observatory

As previously mentioned, a variety of factors, including the type of pizza and the information presented on the packaging, have an effect on the nutritional composition of products offered and on the purchasing behaviour of consumers, and therefore, on

sales. However, the current situation in Canada is not well documented, with most of the studies cited having been conducted in other countries. While there have been a number of studies conducted pertaining to the situation of pizzas from fast-food chains, very few studies focus specifically on refrigerated and frozen pizzas found in grocery stores. In addition, the majority of the studies that were consulted target one or two factors at a time in their analyses, whereas a multivariate approach takes into account all of the attributes of the products simultaneously, which allows for a determination as to which are more significant with respect to the content of the nutrients of interest. Finally, very few studies look at the sale price and purchasing behaviour based on the nutritional composition of the various prepared pizzas.

Within this context, the work done by the Observatory becomes extremely important, because it characterizes the quality of the offer and the purchase of pizzas available in Canada with a view to objectively tracking them over time. This type of tracking allows for actions aimed at improving the nutritional quality of pizzas offered in Canada to be directed more effectively and to better understand their impact on consumer purchasing decisions.

Objectives

The objectives of this study on refrigerated and frozen pizzas available in grocery stores are as follows:

- 1) A- Catalogue the types of pizzas available in Canada;
B- Characterize the nutritional composition and document the sale price per unit of pizzas offered and sold in Canada.
- 2) A- Verify the extent to which the information presented on the packaging (e.g.: type of crust, sauce, target clientele) and the sale price are associated with the content of certain nutrients of interest in the pizzas offered and sold;
B- Verify the extent to which the information presented on the packaging is simultaneously associated with the content of certain nutrients of interest in the pizzas sold and with the price per unit.
- 3) Examine the sales breakdown (in kg) and the total contribution of nutrients from pizzas based on their type and the information presented on the packaging.

Methodology

4.1 Data pertaining to nutritional composition

In order to meet the research objectives, the data pertaining to the nutritional composition of the various pizzas were obtained through Health Canada. The data collection was carried out in supermarkets (e.g.: Metro, IGA, Provigo, Safeway) and big-box stores (e.g.: Walmart, Costco) across Canada between February and July 2017. Health Canada used sales volume data from the *NielsenIQ*⁴¹ company to devise a sampling plan for products to be examined in order to obtain a representative sampling of the pizzas sold in Canada. Using this approach, pizzas originating from companies representing the majority of pizza sales in Canada (approximately 80%) were identified and purchased during visits to grocery stores⁴¹.

Data collection was carried out across Canada between February and July 2017.

Frozen pizzas, snack-sized pizzas and refrigerated pizzas were included in the analyses, while pizza crusts without sauce were excluded. A total of 155 products were examined.

The information found on the product packages (e.g.: the Nutritional Facts Table and the list of ingredients) was entered into an Excel file by the *NielsenIQ* company, which carried out quality control activities to ensure the accuracy of the data entry. Additional verifications were then carried out by Health Canada to compare the unique product code with the data on the package. The following nutritional composition variables were used for the purposes of this study: calories (kcal), fats (g), saturated fats (g), total sugar (g), fibre (g), protein (g) and sodium (mg). The price of each product was obtained using the *NielsenIQ* database, and the sale price per serving was then calculated.

4.2 Product classifications and definitions

All of the pizzas that were catalogued were grouped according to the classifications presented in Table 1. The classifications are based on grey literature and the scientific literature.

Table 1. Classifications of pizzas based on type and the information presented on the packaging

Classifications ^a		Definitions
Type ^b	Vegetables	Pizza containing vegetables and/or fruits only. Includes olives, onions and jalapenos (if visible or if indicated in the product name or on the main face of the product). Excludes potatoes, herbs, pesto, tomato paste and vegetable powder.
	Deli meats	Pizza containing deli meats only. Includes bacon and sausage.
	Meat	Pizza containing meat, poultry, fish or seafood only. Excludes deli meats.
	Vegetables and deli meats	Pizza containing vegetables and deli meats.
	Vegetables and meat	Pizza containing vegetables and meat and/or poultry. Excludes deli meats.
	Meat and deli meats (with or without vegetables)	Pizza containing meat or poultry and deli meats. May contain vegetables.
	Cheese only	Pizza containing cheese only.
	No toppings	Pizza without cheese, deli meats, meat or vegetables (e.g.: pizza with tomato sauce).
Crust	Traditional	Pizza with traditional and/or thick crust. The bottom of the crust may be thin if the outside is thick.
	Thin	Pizza with a thin, light crust.
	Calzone	Dough completely covering the pizza (pizza pocket style). May be traditional, thin, fried, flaky or baked.
Sauce ^c	Tomato	Pizza made with a tomato, pesto or vegetable sauce.
	Rosé	Pizza made with a rosé sauce (mix of tomato sauce and white sauce).
	White	Pizza made with a cream, bechamel, cheese or tzatziki sauce.
	Other	Pizza made with another type of sauce not listed above (barbecue sauce, garlic butter, etc.).
Target clientele ^d	Children	Pizza targeted to children, where the following is displayed or indicated on the packaging: <ul style="list-style-type: none"> - That it is a product for children; - A character / image / film / show targeted to children; - An activity or promotion targeted to children; - An amusing or fantastic theme; - Use for lunch boxes or for school; - A shape or name intended to attract the attention of children.
	Health-conscious	Pizza targeted specifically to health-conscious people. For example, healthy, sensible, balanced choice. Includes the brand image.
	General population	No specific target clientele.
Specific characteristics ^e	Considered authentic	If a term on the packaging or the product name explicitly mentions authentic, country-style, old-style, vintage, wood oven, baked in a stone oven, traditional, real (used as a synonym for authentic), artisan/artisanal, old-fashioned, hand-stretched or any other derivative term. Excludes any terms that refer to the origin of the ingredients.
	Basic	All pizzas not classified as organic, natural or authentic.

^a Only the photo on the main face of the packaging was used in classifying the pizzas. ^b The sauce was excluded and the cheese was included. ^c If the sauce was not visible and nothing was specified on the packaging, the list of ingredients was consulted to determine the type of sauce. ^d If a product fits into two categories, the "children" classification prevails over the "health-conscious" classification. The "diet" classification that was previously established was removed because no products fit into this category. ^e The "Organic" and "Natural" classifications that were previously established were removed because no products fit into these categories.

The first classification for the types of pizzas was based on the content of their toppings. Figure 1 shows a pictorial view of the eight types of pizzas present on the Canadian market.

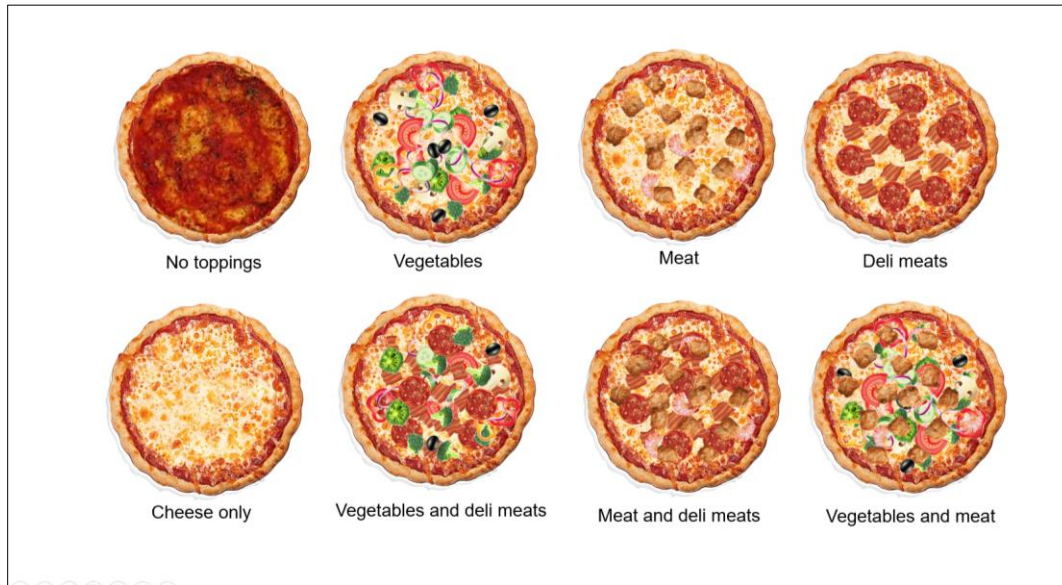


Figure 1. Presentation of the various types of pizzas based on content

In addition to the type of pizza, each product was also classified based on certain information presented on the packaging. As detailed in Table 1, classifications were carried out based **on type of crust, sauce, target clientele and specific characteristics**. This classification process was carried out using double coding, and a third person was consulted in the case of discrepancies, with a view to reaching a consensus. It is worth noting that only the photo on the main face was consulted for the purpose of classification, because it was generally the only one available for all of the products.

4.3 Food purchase data

Purchase^a data allow for tracking of the highest sales among the types of products in order to estimate consumption among the population. Purchase data for pizzas sold in Canada were obtained from the *NielsenIQ* company⁴¹. These data cover a 52-week period ending on January 7, 2017⁴¹. The sales volume in kg (hereinafter “sales”) is used throughout the report. The majority of sales information comes from an optical reading of the products purchased at cash registers at stores belonging to major food chains, warehouse clubs and pharmacies (e.g.: Sobeys, Metro, Loblaws, Walmart, Costco,

^a The terms “purchase/purchasing” and “sales” are used interchangeably in this report.

Canadian Tire, Dollarama) in Canada, excluding Newfoundland and Labrador, Yukon, North West Territories and Nunavut.

4.4 Database combining nutritional composition and purchases

The purchase data related to sales were combined with data pertaining to the nutritional composition of pizzas. The collection of data pertaining to nutritional composition was carried out from the purchase data list provided by *NielsenIQ*, so the coverage between the two types of data used in this study is 100%.

4.5 Statistical analyses

With respect to statistical analyses, a 200 g serving was used, because it represents the usual serving size (approximately two slices) and the reference amount established by Health Canada⁴².

In order to present a general description of the nutritional composition and sale price of pizzas available in Canada (offer), averages and standard deviations were calculated first (Objective 1). The descriptive analyses of Objective 1 were then repeated with proportional weighting assigned to sales to account for what the Canadian population buys (purchases). The fact of weighting the averages as a function of sales allows for a more accurate estimate of what Canadians consume, with higher weighting assigned to the most popular pizzas and lower weighting assigned to those that are purchased less frequently.

In order to examine which of the information presented on the packaging is more closely associated with the content of certain nutrients of interest and the sale price of pizzas (Objective 2), univariate analyses of each nutrient and the price per 200 g serving (equivalent to 2 slices) were first conducted for both the offer and purchases. Kruskal-Wallis tests were used for all of the analyses because of the non-normality of the residuals when using standard variance analysis. These analyses were then repeated with weighting assigned to sales in order to better represent what the Canadian population buys. Multivariate regression analyses were then carried out on the rankings with the weighted data, using the type of pizza, crust, sauce, target clientele and specific characteristics as independent variables.

Finally, in order to examine the sales breakdown by classification (Objective 3), graphs were created to illustrate the total contribution of nutrients compared to sales. The

significance threshold for all statistical tests was corrected using the Bonferroni method to take into account the multiple comparisons.

5 Results and interpretation of the data

5.1 Diversity of pizzas (Objective 1A)

Table 2 shows the number of different products for each classification, in decreasing order. This represents the diversity of the pizzas offered for each classification.

Table 2. Diversity of pizzas by type and information presented on the packaging (n=155)

Classifications		Diversity (n (%))
Type	Deli meats	48 (31.0)
	Vegetables and deli meats	35 (22.6)
	Vegetables	25 (16.1)
	Cheese only	20 (12.9)
	Vegetables and meat	15 (9.7)
	Meat and deli meats	6 (3.9)
	Meat ^a	3 (1.9)
	No toppings ^a	3 (1.9)
Crust	Thin	65 (41.9)
	Traditional	60 (38.7)
	Calzone	30 (19.4)
Sauce	Tomato	137 (88.4)
	Rosé	8 (5.2)
	White	7 (4.5)
	Other ^a	3 (1.9)
Target clientele	General population	132 (85.2)
	Children	21 (13.5)
	Health-conscious	2 (1.3)
Specific characteristics	Basic	113 (72.9)
	Considered authentic	42 (27.1)

^a Considering the low level of representation, results related to these classifications should be interpreted with caution.

These results demonstrate that most of the pizzas offered on the market contain deli meats only (n=48; 31%) or vegetables and deli meats (n=35; 23%). Pizzas with

vegetables only rank third, with 25 products, which represents 16% of the offer, and cheese pizzas are ranked fourth, with 20 products, or 13% of the offer. The results for meat pizzas and pizzas with no toppings should be interpreted with caution throughout the report because of the low number of products in these classifications.

Thin-crust pizzas are most prevalent on the market (n=65; 42%). Traditional-crust pizzas come in second, with 60 products, or 39% of the offer. A smaller proportion of pizzas have a calzone crust (n=30; 19%). Pizzas with tomato sauce are by far the most numerous on the market (n=137; 88%). Some of the pizzas that were examined have rosé sauce (n=8; 5%) or white sauce (n=7; 5%). The classification for target clientele shows that the majority of pizzas are targeted to the general population (n=132; 85%). Close to 15% of pizzas are targeted to children (n=21; 14%), and a minority are targeted to a health-conscious clientele (n=2; 1%). In terms of specific characteristics, this classification reveals that basic pizzas (with no specific characteristics) are most prevalent (n=113; 73%). Pizzas that are considered authentic represent more than one-quarter of the product offer (n=42; 27%). It is worth noting that no organic or natural pizzas were examined within the context of this study.

Close to 15% of pizzas are targeted to children.

5.2 Nutritional composition and sale price (Objective 1B)

Table 3 shows the nutritional composition and sale price per 200 g serving for the pizzas studied (offer) and sold (purchases), based on the eight different types that were catalogued. In this Table, the nutritional composition of the “offer” refers to the average nutritional composition of the pizzas found on shelves, while the nutritional composition of “purchases” corresponds to the weighted nutritional composition based on sales for each product (n=155 for both the “offer” and “purchases” columns). Similarly, the sale price of the “offer” refers to the average sale price for the pizzas found on shelves, while the sale price for “purchases” corresponds to the average sale price paid by consumers (weighted price as a function of the number of servings sold). Therefore, in the “purchases” column, the nutritional composition of a pizza with high sales volume would have a greater impact on the calculation than that of a pizza with lower sales. For confidentiality purposes, some information concerning sales is not shown for classifications that contain three or fewer products. For the purpose of comparison, each type of pizza was compared to all of the other pizzas (excluding the type of product being studied) and not to the average of all of the pizzas. It is worth noting that only significant differences are described in the following paragraphs.

Table 3. Nutritional composition and sale price of the pizzas offered and sold by type, per 200 g serving

	Calories (kcal)		Fats (g)		Saturated fats (g)		Carbohydrates (g)		Fibre (g)		Sugar (g)		Protein (g)		Sodium (mg)		Sale price (\$)	
	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases
All (n=155)	469±52	474±51	18.4±5.5	19.5±5.7	7.0±2.4	7.5±2.5	56±7	55±6	3.5±1.3	3.3±1.2	6.6±2.9	6.7±2.95	20±4	20±3	994±206	1066±193	1.67±0.41	1.61±0.38
Type																		
Deli meats (n=48/35%)*	493±36	484±37	20.6±4.8	19.9±4.5	7.7±2.5	7.9±2.4	58±7	56±5	3.5±1.2	3.4±1.2	6.6±2.8	6.7±3.0	21±3	20±3	1095±207	1158±158	1.62±0.42	1.56±0.36
Vegetables and deli meats (n=35/26%)	453±40	447±37	16.8±3.8	17.0±3.9	6.7±1.7	6.9±1.6	55±6	54±5	3.7±1.3	3.5±1.1	6.0±2.4	6.1±2.2	20±3	20±3	1028±122	1061±80	1.58±0.43	1.48±0.40
Vegetables (n=25/13%)	448±55	451±44	18.7±5.9	20.4±4.9	6.8±1.9	6.9±1.6	52±5	49±4	3.8±1.2	3.4±1.2	5.9±2.4	5.2±1.6	18±4	16±3	765±175	840±103	2.08±0.35	2.03±0.27
Cheese only (n=20/11%)	490±79	501±80	19.1±8.3	21.1±9.4	7.5±3.0	8.4±3.5	60±6	59±6	3.7±1.4	3.7±1.5	6.8±2.9	8.1±3.6	20±4	21±3	1045±187	1119±187	1.57±0.31	1.49±0.24
Vegetables and meat (n=15/6%)	434±42	418±37	14.8±4.6	14.3±4.2	6.5±2.6	6.1±2.2	55±8	53±4	3.2±1.6	2.9±1.0	7.9±4.5	6.6±2.8	20±3	20±2	902±145	886±78	1.74±0.32	1.64±0.38
Meat and deli meats (n=6/7%)	472±20	470±16	18.4±1.7	18.0±1.6	7.2±0.7	6.8±0.6	53±5	54±3	2.9±1.1	2.5±1.1	5.9±1.3	6.7±1.0	22±3	22±1	1092±106	1120±47	1.41±0.39	1.29±0.21
Meat (n=3/1%)	458±48	472±34	16.1±7.0	18.1±5.4	7.8±3.1	8.7±2.4	64±5	63±5	2.1±0.9	2.3±0.8	10.4±5.9	10.3±5	16±0	16±0	771±102	742±76	-	-
No toppings (n=3/0%)	491±37	522±23	16.3±1.6	15.2±0.9	1.1±0.2	1.1±0.1	73±7	79±4	2.9±1.0	2.3±0.5	7.5±1.3	8.3±0.7	13±1	15±1	1056±136	1126±68	-	-

Average ± standard deviation

Offer=Nutritional composition or price of pizzas offered on the market (n=155) / Purchases=Nutritional composition or price of pizzas sold (the average was weighted as a function of the number of servings sold) (n=155).

Cells highlighted in orange signify that the value is significantly higher than the other types of pizzas, while cells highlighted in blue signify that the value is significantly lower than the other types of pizzas. A difference is considered significant at a threshold of 0.0617% (p<0.000617). This threshold corresponds to the Bonferroni correction (5% / 81).

* The n represents the number of products offered, and the percentages indicate the percentage of sales. Sales totals rather than the number of products determine the power of the tests carried out for purchases.

- Price not shown

Very few differences were noted with respect to the **offer** of the various types of pizzas. As it turns out, only pizzas with deli meats and vegetable pizzas differ from the others. In fact, the amount of **calories, fats** and **sodium** per serving is higher in pizzas with deli meats compared with the other types of pizzas. In addition, the content of **carbohydrates, protein** and **sodium** is lower in pizzas with vegetables only. The sale price is just as high for vegetable pizzas compared to the other types.

The amount of calories, fats and sodium per serving is higher in pizzas with deli meats compared with the other types of pizzas.

The following paragraph presents the results related to **purchases** (the nutritional composition being weighted for sales). In addition, only those results that become significant after weighting for sales and added to the results presented in the previous paragraph are interpreted. First, pizzas with vegetables and deli meats have lower contents of **calories** compared to the other types of pizzas. In addition, the content of **carbohydrates** for pizzas with cheese only is higher compared to the others. Finally, the **sodium** content is lower for pizzas with vegetables and meat compared to the other pizzas.

In addition to characterizing the nutritional composition of pizzas offered and sold in Canada by type, Table 3 shows that the average pizza sold has a nutritional profile that is quite similar to the average of pizzas offered.

Beyond the absolute nutritional value, it is also possible to present the nutritional composition in a relative manner by comparing it with the thresholds recommended by Health Canada for displaying a nutritional symbol on the front of the packaging. The 30% threshold is recommended for representation of an excessive amount of sugar, sodium or saturated fats for a reference serving or suggested serving for meals or prepackaged main dishes (e.g.: 200 g of pizza). Therefore, the 30% threshold can be used by Health Canada in the coming years for displaying a nutritional symbol on the front of the packaging for pizza⁴³. The following Figures show the types of pizzas that do not exceed the 30% daily value threshold for the nutrients of interest “to be limited”, namely saturated fats (6 g / 200 g [Figure 2]) and sodium (700 mg / 200 g [Figure 3]). In addition to showing the sodium content compared to the 30% daily value threshold,

Figure 3 also shows the sodium content of pizzas compared to the voluntary sodium reduction targets issued by Health Canada in 2012 (Step III target: 400 mg / 100 g or 800 mg / 200 g)⁴⁴. In addition to the nutrients of interest “to be limited”, attention was also paid to the protein and fibre content of pizzas, because these nutrients are also relevant within the context of a healthy diet. Therefore, Figure 4 shows a threshold of 18 g of protein, which is approximately 30% of the daily intake of protein^b or the approximate protein content for a meal. Figure 5 shows the thresholds of 2 g and 4 g for fibre, because these values correspond to the claims “source of fibre” and “high source of fibre” respectively ⁴⁵. It is worth noting that the **size of the circles illustrates the sales** (in kg) for each product (the larger the circle, the higher the sales volume).

Figure 2 shows that 71% (n=110/155) of pizzas have a content that is higher than or equal to the 30% daily value threshold for **saturated fats** (i.e.: 6 g per 200 g serving). In addition, the majority of leading sellers are above this threshold.

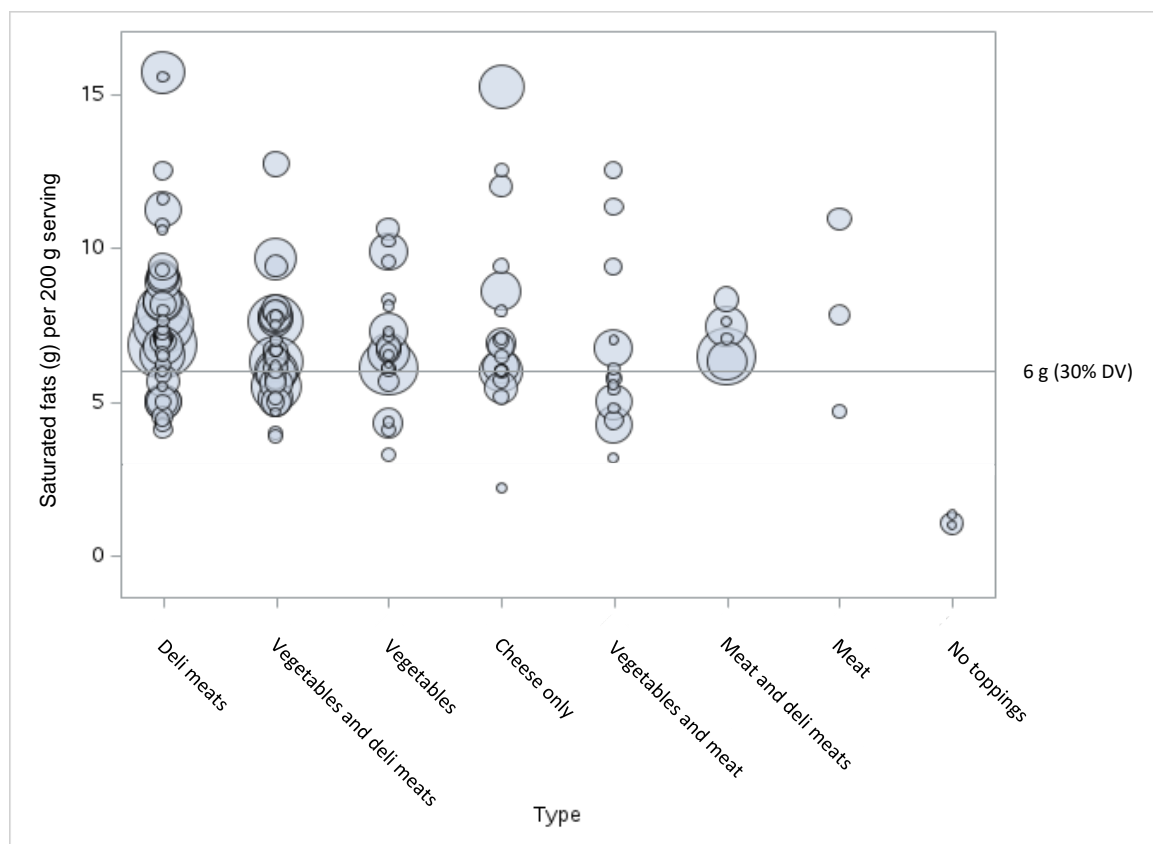


Figure 2. Saturated fat content of the various types of pizzas and their sales per 200 g serving (n=155)

^b The daily protein requirement for an average individual weighing 75 kg is 60 g, or 0.8 g of protein per kg of body weight.

More specifically, pizzas with meat and deli meats exceed the 30% threshold for saturated fats most frequently (n=6/6; 100%), followed by vegetable pizzas (n=20/25; 80%), cheese pizzas (n=16/20; 80%) and pizzas with deli meats (n=37/48; 77%). Conversely, pizzas with no toppings (n=0/3; 0%) and pizzas with vegetables and meat (n=6/15; 40%) exceed the threshold least frequently.

Figure 3 shows that the vast majority of pizzas (n=145/155; 94%) exceed the 30% threshold for sodium (i.e.: 700 mg per 200 g serving).

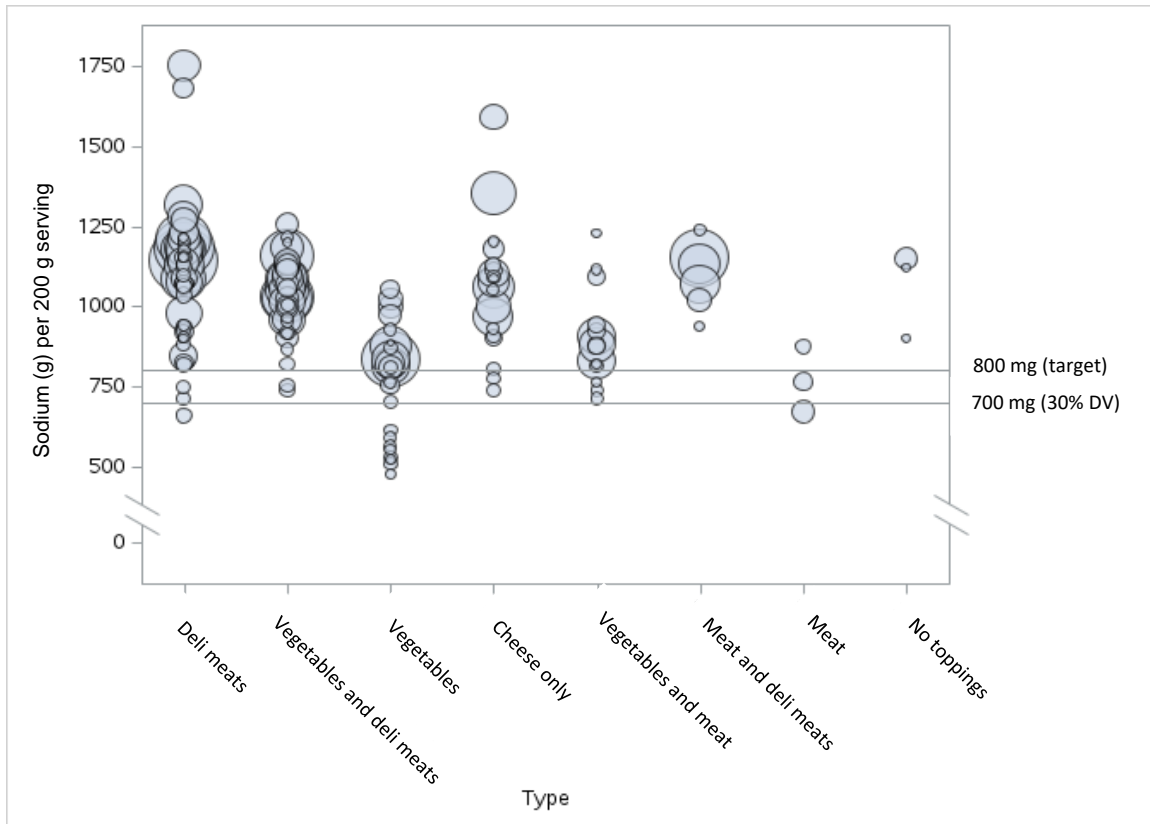


Figure 3. Sodium content of the various types of pizzas and their sales per 200 g serving (n=155)

Only some meat pizzas (n=1/3; 33%), vegetable pizzas (n=8/25; 32%) and pizzas with deli meats (n=1/48; 2%) respect the 30% threshold. Health Canada established the voluntary sodium reduction target at 400 mg per 100 g (weighted value for sales), or 800 mg for a 200 g serving of pizza. Overall, 85% of pizzas exceed the voluntary sodium reduction target. Meat pizzas (n=2/3; 67%) and vegetable pizzas (n=11/25; 44%) respect the target most frequently. On the other side, all of the pizzas

94% of pizzas exceed the 30% daily value threshold for sodium and 85% exceed the voluntary sodium reduction target.

with meat and deli meats (n=6/6; 100%) and those with no toppings (n=3/3; 100%) exceed this target.

As shown in the following Figure (Figure 4), more than two-thirds of the pizzas (n=107/155; 69%) have 18 g or more of **protein** per 200 g serving.

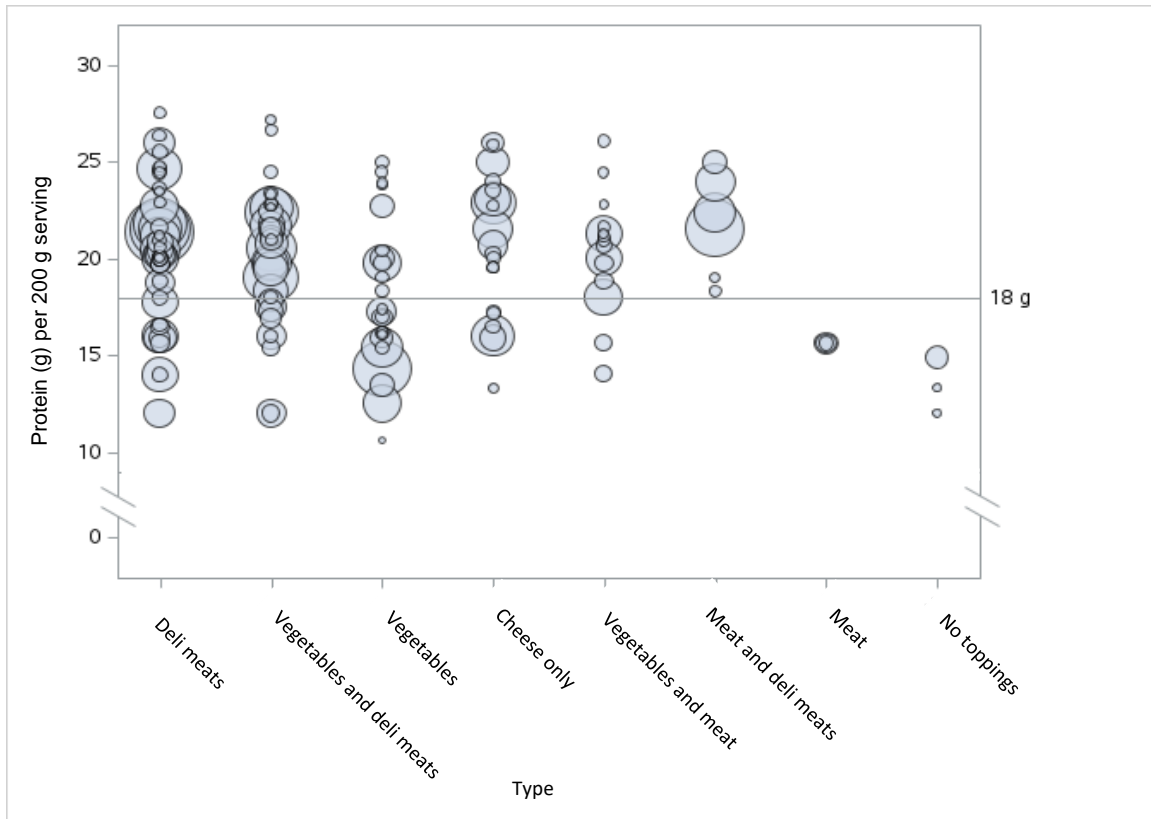


Figure 4. Protein content of the various types of pizzas and their sales per 200 g serving (n=155)

More specifically, pizzas with meat and deli meats (n=6/6; 100%) and pizzas with vegetables and meat (n=12/15; 80%) most frequently exceed the threshold of 18 g of protein per 200 g of pizza, whereas meat pizzas (n=3/3; 100%), pizzas with no toppings (n=3/3; 100%) and vegetable pizzas (n=14/25; 56%) are most frequently under the threshold.

Figure 5 shows that less than half of the pizzas (n=70/155; 45%) attain the minimum threshold of 4 g per serving required for the claim of “high source” of fibre.

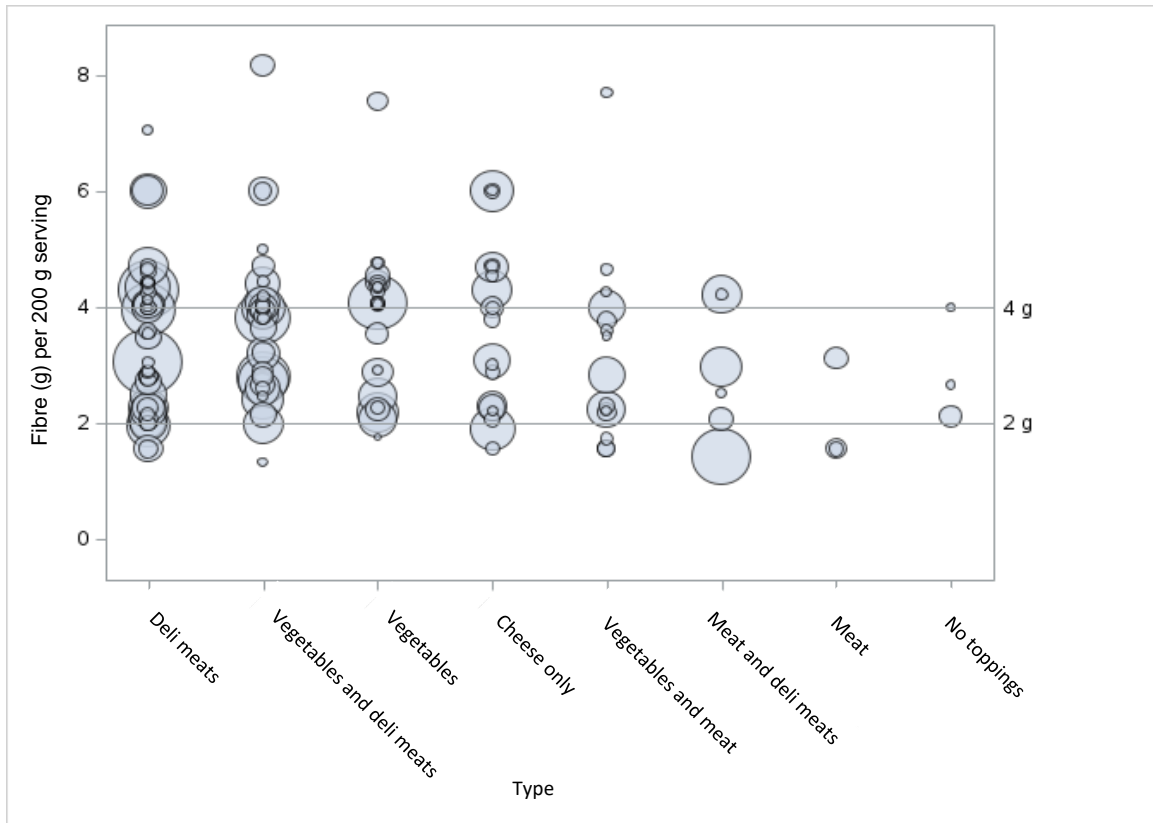


Figure 5. Fibre content of the various types of pizzas and their sales per 200 g serving (n=155)

Vegetable pizzas (n=16/25; 64%) and cheese pizzas (n=10/20; 50%) attain the threshold of 4 g of fibre most frequently. Conversely, meat pizzas (n=0/3; 0%) and pizzas with vegetables and meat (n=4/15; 27%) attain the threshold least frequently. The large majority of pizzas (91%) attain the level of 2 g of fibre per serving, which signifies that they are a source of fibre.

5.3 Nutritional composition and sale price based on the information presented on the packaging (univariate analyses) (Objective 2A)

Table 4 shows the nutritional composition and sale price of pizzas offered and sold by type of crust, sauce, target clientele and specific characteristics. The data are once again presented per 200 g serving. For this section, significant differences are measured in comparison with the reference pizza for each classification (i.e.: traditional crust, tomato, general population and basic).

Table 4. Nutritional composition and sale price of pizzas offered and sold by the information presented on the packaging per 200 g serving

	Calories (kcal)		Fats (g)		Saturated fats (g)		Carbohydrates (g)		Fibre (g)		Sugar (g)		Protein (g)		Sodium (mg)		Sale price (\$)	
	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases
Crust																		
Traditional [§]	468±44	467±47	17.1±4.5	18.0±5.0	6.6±2.7	7.2±2.8	59±7	56±5	3.3±1.2	2.9±0.9	6.3±2.4	6.8±2.5	20±3	21±2	1122±175	1136±154	1.45±0.30	1.38±0.26
Thin (n=65/40%)	458±61	457±53	18.3±6.2	18.8±5.8	7.5±2.1	7.7±1.6	52±7	52±5	3.8±1.1	3.6±1.1	6.0±2.9	5.1±1.7	21±4	19±3	902±198	996±161	1.98±0.34	1.85±0.39
Calzone (n=60/12%)	495±33	503±25	21.4±4.4	22.3±3.2	6.9±2.4	6.6±2.2	60±6	63±6	3.4±1.7	4.0±1.9	8.5±3.3	10.3±3.0	17±3	16±3	940±146	1006±152	1.68±0.43	1.52±0.35
Sauce																		
Tomato [§]	468±47	468±46	18.3±5.0	18.7±5.1	6.9±2.4	7.3±2.4	56±7	55±6	3.6±1.3	3.4±1.2	6.4±2.6	6.4±2.7	20±4	20±3	1010±207	1079±167	1.63±0.42	1.54±0.38
Rosé (n=8/4%)	441±27	429±15	17.8±4.6	17.4±2.5	6.8±1.2	7.1±0.7	53±6	52±5	3.9±1.8	2.8±1.1	8.4±4.1	7.4±2.2	18±3	16±3	872±162	865±78	2.06±0.10	2.07±0.08
White (n=7/2%)	472±40	472±32	19.3±3.3	19.8±2.9	9.6±2.1	9.6±1.5	53±7	53±6	2.1±0.8	2.0±0.7	7.0±3.7	7.8±3.4	20±5	20±4	869±167	909±123	1.90±0.14	1.95±0.12
Other (n=3/1%)	565±18	624±157	23.7±21.1	31.3±16.9	7.7±4.4	9.6±2.7	69±5	67±3	3.3±1.5	3.0±1.2	12.0±7.0	10.4±6.4	21±5	21±5	904±239	975±207	-	-
Target clientele																		
General population [§] (n=132/84%)	466±44	462±46	18.1±5.0	18.5±5.2	7.2±2.5	7.6±2.4	56±7	54±5	3.5±1.3	3.2±1.1	6.4±2.8	6.2±2.5	20±3	20±3	982±200	1055±175	1.75±0.40	1.63±0.39
Children (n=21/16%)	501±72	498±55	21.0±7.2	20.5±5.9	6.3±1.8	6.2±1.5	62±9	61±8	3.8±1.5	4.3±1.4	7.8±3.4	8.4±3.3	19±5	19±5	1108±187	1121±128	1.38±0.30	1.30±0.28
Health-conscious (n=2/0%)	350±3	350±2	10.6±0.6	10.7±0.4	3.8±0.7	3.7±0.5	50±5	50±3	4.4±0.0	4.4±0.0	8.4±3.7	9.1±2.5	16±1	16±1	591±159	621±108	-	-
Specific characteristics																		
Basic [§] (n=113/86%)	472±54	467±50	19.1±5.8	18.9±5.6	7.2±2.4	7.4±2.3	56±7	55±6	3.4±1.2	3.4±1.1	6.9±3.0	6.8±2.8	19±4	20±3	1018±198	1068±170	1.61±0.42	1.53±0.39
Authentic	460±45	466±43	16.7±4.1	18.5±3.8	6.7±2.5	7.0±2.3	56±8	55±7	3.8±1.6	3.3±1.6	5.7±2.6	4.9±1.6	21±3	21±3	932±218	1047±180	1.88±0.32	1.88±0.27

Average ± standard deviation

Offer=Nutritional composition or price of pizzas offered on the market (n=155) / Purchases=Nutritional composition or price of pizzas sold (average weighted as a function of the number of servings sold) (n=155)

[§] Classification as reference with which comparisons are carried out.

Cells highlighted in orange signify that the value is significantly higher than the reference for the classification, whereas cells highlighted in blue signify that the value is significantly lower than the reference for the classification. A difference is considered significant at a threshold of 0.0694% (p<0.000694). This threshold corresponds to the Bonferroni correction (5% / 72).

*The n represents the number of products offered, and the percentages indicate the percentage of sales. Sales totals rather than the number of products determine the power of the tests carried out for purchases.

- Price not shown

The analyses carried out on the **pizza offer** based on the **type of crust** lead to the conclusion that thin-crust pizzas contain less carbohydrates and sodium than traditional-crust pizzas, but have a higher sale price. In addition, pizzas with calzone crust have a higher fat content and lower protein and sodium contents than traditional-crust pizzas.

The **sauce**, **target clientele** and **specific characteristics** do not affect the nutritional composition of the pizza offer. Considering the low number of products in the classifications aside from the reference, the absence of differences may be explained by a lack of statistical power. Nevertheless, it is worth noting that pizzas targeted to children have a lower sale price than those targeted to the general population for the same reference serving (200 g).

Once again, in order to obtain values that are more representative of the pizzas found in Canadian grocery carts, the analyses were carried out with weighting assigned to sales (“purchases” columns). As such, the averages are weighted by assigning more weight to products with higher sales volumes and less weight to those purchased less frequently. The results that were observed based on pizza purchases are generally similar to those based on the offer, with a few differences that are described below. Once again, only significant differences added to those mentioned in the two previous paragraphs are described in the following paragraph.


With respect to **type of crust**, thin-crust pizzas have a higher fibre content and lower sugar and protein contents than traditional-crust pizzas after weighting for sales. Calzones have higher calorie, carbohydrate and sugar contents than traditional-crust pizzas. In terms of **sauce**, the sodium content for pizzas with rosé sauce is lower than that for pizzas with tomato sauce. When it comes to **target clientele**, pizzas targeted to children have higher calorie, carbohydrate and fibre contents and a lower saturated fat content compared to pizzas targeted to the general population. As for **specific characteristics**, pizzas that are considered authentic have a lower sugar content compared to basic pizzas (pizzas with no specific characteristics).

5.4 Nutritional composition and sale price based on the information presented on the packaging (multivariate analyses) (Objective 2B)

Although they may be revealing from a descriptive perspective, the results shown in Tables 3 and 4 originate from univariate analyses that do not take into account all of

the confounding factors. In light of this, an additional series of analyses was carried out with a view to simultaneously controlling for the main independent variables (i.e.: type of pizza, type of crust, sauce, target clientele and specific characteristics) with weighting for sales in the same multivariate model. These analyses take into account the information presented on the packaging, and allow for the differences within each classification to be highlighted by controlling for the other classifications. For example, considering that pizzas with calzone crust are most frequently targeted to children, multivariate analyses enable a comparison of the nutritional composition of pizzas by target clientele (children) while neutralizing the effect of the type of crust (calzone), and vice-versa. Therefore, these analyses allow for a classification to be analyzed while neutralizing the effect of other product properties. As such, the results shown in Table 5 are particularly useful in identifying which attributes of pizzas would benefit most from modification with a view to improving the nutritional composition of pizzas purchased by the Canadian population.

First, with respect to the **type of crust**, Table 5 shows that thin-crust pizzas have higher contents of saturated fats and fibre and lower sugar contents than traditional-crust pizzas. Thin-crust pizzas also have a higher sale price. Calzones also stand apart from traditional-crust pizzas with higher calorie, fat, carbohydrate and sugar contents and lower protein and sodium contents.



Calzones stand apart from traditional-crust pizzas with higher calorie, fat, carbohydrate and sugar contents and lower protein and sodium contents.

Pizzas with **rosé sauce** have a higher sugar content, while pizzas with white sauce have a higher saturated fat content compared to pizzas with tomato sauce.

As for the **target clientele**, pizzas targeted to children have a lower saturated fat content and a higher fibre content compared to pizzas targeted to the general population.

Finally, when it comes to **specific characteristics**, pizzas that are considered authentic have a lower sugar content than basic pizzas.

Table 5. Multivariate analyses of the nutritional composition and sale price of pizzas sold based on the information presented on the packaging per 200 g serving

	Calories (kcal)	Fats (g)	Saturated fats (g)	Carbohydrates (g)	Fibre (g)	Sugar (g)	Protein (g)	Sodium (mg)	Sale price (\$)
Crust									
Traditional [§] (n=60/49%)	0	0	0	0	0	0	0	0	0
Thin (n=65/40%)	-4±8	0.3±1.0	0.5±0.4	-2.6±0.8	1.0±0.2	-2.0±0.4	-0.1±0.4	-69±25	0.39±0.07
Calzone (n=60/12%)	26±13	4.3±1.6	-1.3±0.7	5.4±1.4	0.8±0.3	3.1±0.7	-6.0±0.7	-150±39	0.19±0.11
Sauce									
Tomato [§] (n=137/93%)	0	0	0	0	0	0	0	0	0
Rosé (n=8/4%)	-6±18	0.4±2.2	0.5±0.9	0.6±1.9	-0.9±0.5	2.4±1.0	-2.9±1.0	-44±55	0.33±0.15
White (n=7/2%)	5±24	0.8±2.9	3.9±1.2	-4.2±2.5	-1.7±0.6	0.1±1.3	2.1±1.3	-67±72	0.44±0.20
Other (n=3/1%)	169±41	15.0±4.9	1.7±2.1	8.2±4.2	-1.1±1.0	3.2±2.2	2.0±2.2	36±122	0.04±0.33
Target clientele									
General population [§] (n=132/84%)	0	0	0	0	0	0	0	0	0
Children (n=21/16%)	12±11	-0.2±1.3	-1.3±0.5	3.2±1.1	1.2±0.3	0.1±0.6	0.7±0.6	32±32	-0.20±0.09
Health (n=2/0%)	-104±75	-9.9±8.9	-3.2±3.8	1.3±7.7	0.7±1.9	4.7±4.0	-0.8±3.9	-221±223	-
Specific characteristics									
Basic [§] (n=113/86%)	0	0	0	0	0	0	0	0	0
Considered authentic (n=42/14%)	9±10	0.4±1.2	-0.3±0.5	0.7±1.1	0.3±0.3	-1.6±0.6	1.1±0.5	-6±31	0.42±0.09

Coefficient ± standard error

[§] Classification as reference with which comparisons are carried out.

Cells highlighted in orange signify that the value is significantly higher than the reference classification, whereas cells highlighted in blue signify that the value is significantly lower than the reference classification. A difference is considered significant at a threshold of 0.625% ($p < 0.00625$). This threshold corresponds to the Bonferroni correction (5% / 8).

* The n represents the number of products for which sales data are available and the percentages indicate the percentage of sales.

- Price not shown

5.5 Sales and total contribution of nutrients (Objective 3)

The goal of Objective 3 is to examine the sales breakdown and the total contribution of nutrients of pizzas purchased by Canadians. Toward this end, the total annual sales data provided by the *NielsenIQ* company were analyzed as a function of the number of residents in Canada⁴⁶. The result is that all sales of pizzas sampled in Canada in 2017 represented a total intake of 3,240 kcal, 130 g of fat, 51 g of saturated fats, 382 g of carbohydrates, 45 g of total sugar, 23 g of fibre, 138 g of protein and 7,385 mg of sodium per Canadian per year. The number of residents was calculated using population projections for the year 2017 (36,708,083 residents), which coincides with the purchase data for this study. The intake of nutrients originating from pizzas sold in Canada is shown in the Appendix by type of pizza (Table 7), type of crust (Table 8), sauce (Table 9), target clientele (Table 10) and specific characteristics (Table 11).

In addition to the contribution of nutrients from products based on total annual sales (n=155 products), the results can also be interpreted by taking into account the **50 top-selling pizzas** (per kg) during the year. Table 6 lists the top 50 pizzas – by type – that contributed the most to nutrients of interest based on sales. It can then be observed that the 50 top-selling pizzas

The 50 top-selling pizzas represent 32% of the products offered, but more than 80% of all sales in dollars.

represent 32% of the products offered, but more than 80% of all sales in dollars. Pizzas with deli meats (n=19) and pizzas with vegetables and deli meats (n=13) are found most frequently among the top 50 pizzas in terms of sales. Pizzas with deli meats represent 30% of the sales in kg, but 33% of the intake of saturated fats and sodium. It is worth noting that no meat pizzas or pizzas with no toppings were among the 50 top-selling pizzas during 2017.

Table 6. Contribution of the 50 top-selling pizzas by type

Type of pizza	% number of products*	% sales (\$)	% sales (kg)	% contribution saturated fats	% contribution sugar	% contribution sodium	% contribution fibre	% contribution protein
Deli meats (n=19)	12.3	32.1	30.1	32.8	31.0	33.2	30.8	31.0
Vegetables and deli meats (n=13)	8.4	19.4	20.0	18.4	19.5	20.0	20.1	20.0
Cheese only (n=7)	4.5	8.8	8.8	10.3	11.7	9.5	9.7	9.2
Vegetables (n=5)	3.2	11.5	8.5	7.9	6.4	6.7	7.6	6.6
Vegetables and meat (n=3)	1.9	4.2	3.9	2.9	3.6	3.2	3.5	3.9
Meat and deli meats (n=3)	1.9	5.5	6.6	6.0	6.9	6.9	4.9	7.4
Total (n=50)	32.3	81.5	77.8	78.2	79.1	79.5	76.6	78.1

* Proportion of the 155 pizzas studied (percentage).

The following paragraphs present the contribution of nutrients from certain classifications of pizzas compared to the entire offer. This information provides an overall view of the contribution of each nutrient for a given classification. Graphs are presented for the most relevant classifications among these analyses (i.e.: type of pizza and target clientele). In these three graphs, each bar includes all 155 pizzas. The contribution of nutrients was compared to the total contribution to sales in the form of ratios. Sales in kg were used to calculate the ratios. A ratio of 1.0 represents a neutral contribution, or in other words, a contribution that is proportional to the observed sales. Therefore, only the most significant “contribution of nutrients / total contribution to sales” ratios are mentioned in the text, namely those **less than 0.75** (low contribution) or **greater than 1.25** (high contribution). It is worth noting that the ratios are not indicated in the figures.

By way of example, in Figure 6, which shows the results by type of pizza, each bar is separated into eight colours, with each colour representing a type of pizza. Continuing with this example, the bar for fibre represents the contribution of each type of pizza to the total contribution of fibre originating from this food category. As such, it is possible to see at a glance that pizzas with meat and deli meats (in yellow) take up less space on the fibre bar than on the sales volume bar (in kg) (ratio of 0.74). Therefore, it can be concluded that pizzas with meat and deli meats have a low fibre contribution among this food category, as compared to sales of this type of pizza. In other words, pizzas with meat and deli meats provide less fibre than their sales would seem to indicate.

Figure 6 shows the contribution of pizzas by **type** to the entire offer based on the total number of products, total sales and the main nutrients of interest.

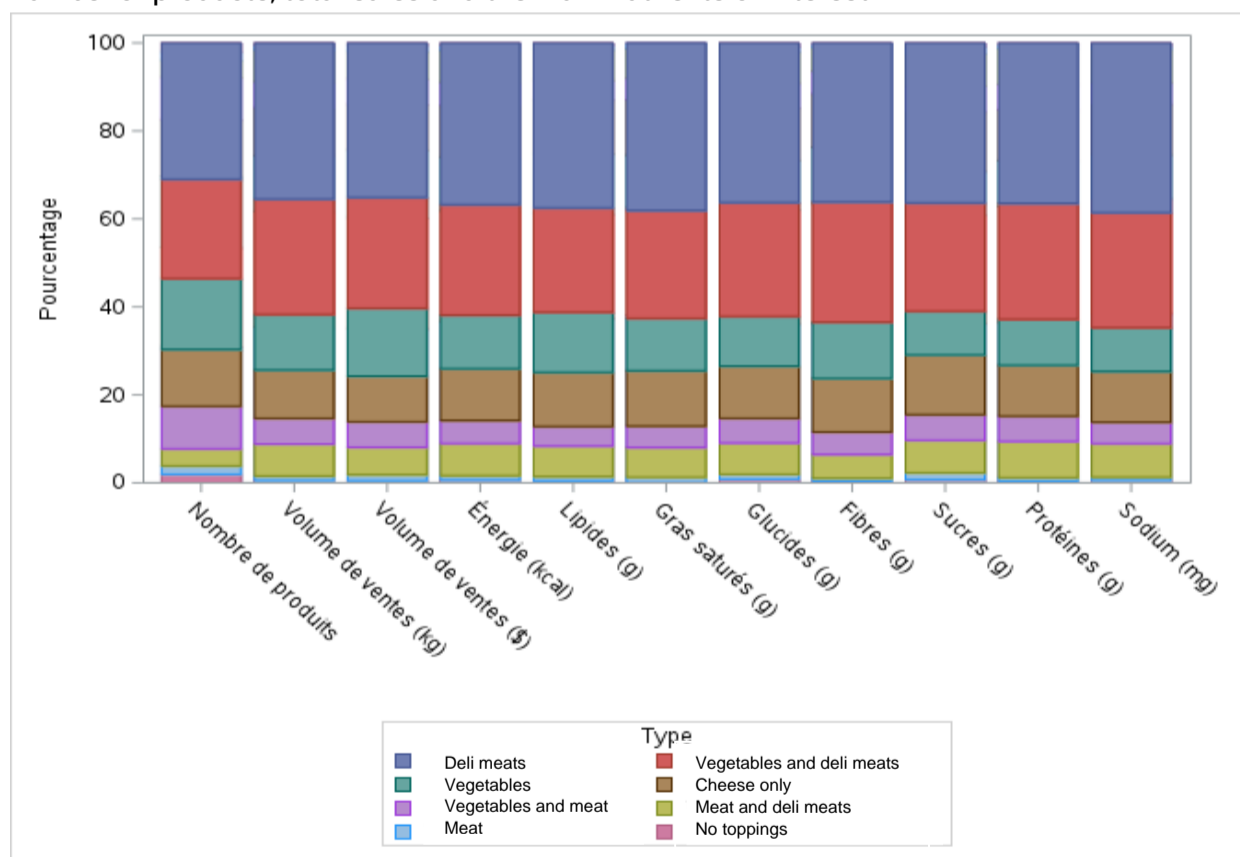


Figure 6. Contribution of each type of pizza compared to all pizzas

The ratios of the contribution of nutrients over sales volume (kg) reveal that the fibre contribution of pizzas with meat and deli meats is low compared to their sales (ratio: 0.74). Meat pizzas have a low contribution of fibre and sodium (ratios: 0.69 and 0.70 respectively), but a high contribution of sugar (ratio: 1.58) compared to their sales. Finally, pizzas with no

toppings have a low contribution of saturated fats, fibre and protein (ratios: 0.15, 0.70 and 0.73 respectively) and a high contribution of carbohydrates and sugar (ratios: 1.43 and 1.26 respectively) compared to their sales (data not shown). However, since these three types of pizzas are under-represented on the market, these results should be interpreted with caution.

Figure 7 presents the contribution of each pizza by **target clientele** to the entire offer based on the total number of products, total sales and the main nutrients of interest.

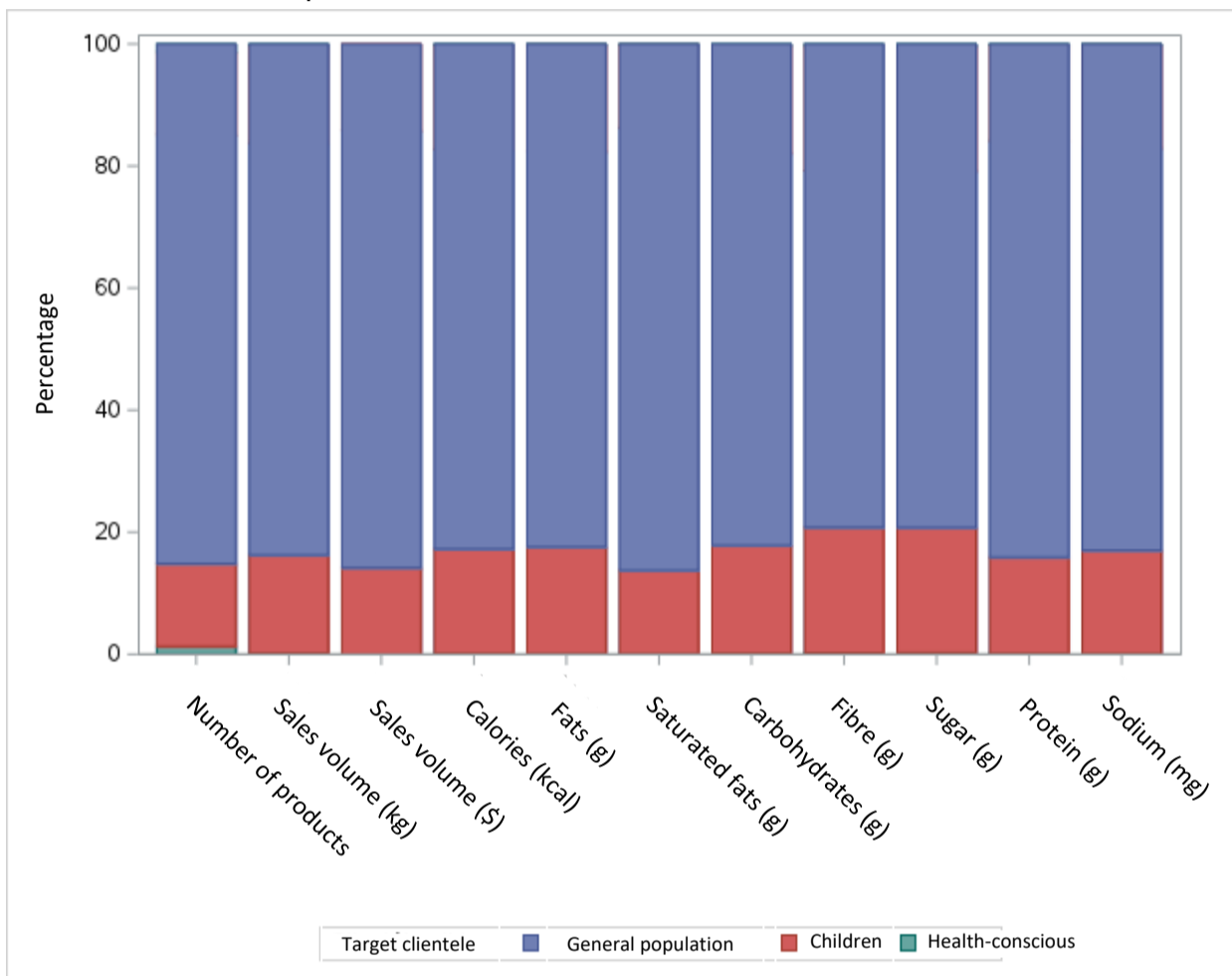


Figure 7. Contribution of pizzas by target clientele compared to all pizzas

The ratios obtained from this Figure suggest that pizzas targeted to children contribute more to fibre and sugar than their sales would seem to indicate (ratios: 1.28 and 1.27 respectively). Pizzas targeted to a health-conscious clientele have a lower contribution of fats, saturated fats and sodium (ratios: 0.57, 0.50 and 0.58 respectively) and a higher contribution of fibre and sugar (ratios: 1.31 and 1.39) compared to their sales (data not shown).

Discussion

The main objective of this study was to characterize the nutritional composition of the offer and purchases of pizza in Canada. The pizzas included in this study were frozen pizzas, snack pizzas, calzones and refrigerated pizzas sold in Canada in 2017. As a first step, the analysis of these pizzas allowed for each product to be classified according to its type. This classification was inspired by the classification proposed by the OQALI in 2011¹⁷. Each product was also classified by type of crust, sauce, target clientele and specific characteristics. These classifications allowed for the various objectives related to this food category to be attained.

From the outset, analyses related to the nutritional composition were carried out on a sampling of 155 pizzas, which represents adequate coverage of the Canadian market in terms of sales (approximately 80%) (Objective 1A). In France, the OQALI catalogued 213 different products in 2010, but unlike this study, the OQALI only studied frozen pizzas. The analysis of the portrait of pizzas available in Canada shows that the greatest degree of product **diversity** (number of different products) is seen among pizzas with deli meats and pizzas with

Pizzas with deli meats and pizzas with vegetables and deli meats are the most numerous on the market and the leading sellers.

vegetables and deli meats, because they represent 31% and 23% of the entire pizza offer respectively. These pizzas are also the leading sellers, with 35% and 26% of all sales in the pizza category respectively. In France, pizzas with cheese only (30%) and pizzas with ham and cheese (22%) were most numerous on the market⁴⁷, which suggests that there are differences among countries.

With respect to the **type of crust**, thin-crust pizzas are most numerous on the market (42%), closely followed by traditional-crust pizzas (39%). However, traditional-crust pizzas still have the highest sales volume (49% compared to 40% for thin-crust pizzas). The higher price for thin-crust pizzas may explain their lower sales volume, but since no other study seems to have compiled information concerning the type of crust, it is difficult to compare the results that were observed. In terms of sauce, pizzas with **tomato sauce** are the most numerous on the market (88% of the offer) and the leading sellers (93% of sales), as expected. Pizzas with rosé, white or other sauces are less prevalent with lower sales. In terms of **target clientele**, pizzas targeted to children represent 13.5% of the pizza offer. This proportion is similar to other categories of food that have been analyzed by the Observatory, including breakfast cereals, granola bars, cookies and yogurts and dairy desserts^{48,49}. Pizzas targeted to a health-conscious clientele are less numerous, and the percentage is lower than in other categories of food that have been analyzed by the Observatory. For example, 20% of the offer of frozen meals is considered to be “healthy”. It is possible that pizzas targeted to a health-conscious clientele were not included in the study because they may not be among the more popular pizzas, and therefore, were not sampled. In the case of **specific characteristics**, the majority of pizzas are basic (i.e.: pizzas with no specific characteristics), but a non-negligible proportion of products (27%) are considered authentic. Contrary to the results obtained for the other categories of food that have been analyzed by the Observatory, and despite the interest

among consumers for natural pizzas³¹, no natural or organic products were examined. Once again, by basing sampling on the popularity of products, it may be that niche products that are most frequently considered to be natural or organic were not included in the study.

The analyses of the **nutritional composition** of the **pizza offer** based on **type** (Objective 1B) show that, with an average of 235 kcal, 9 g of fat, 3.5 g of saturated fat, 3.3 g of sugar and 497 mg of sodium per 100 g (the equivalent of one slice), the nutritional composition of the pizzas studied in this portrait is very similar to that of the pizzas studied in France in 2010, where average contents were 218 kcal, 8 g of fat, 3.5 g of saturated fat, 2.9 g of sugar and 491 mg of sodium per 100g¹⁷. No other study has examined the average nutritional composition of retail pizzas. However, pizzas offered in supermarkets in Canada have lower contents of saturated fats and sodium compared to pizzas offered in fast-food chains in the United States²² and Australia²³ (6 g and 4.8 g of saturated fat, and 700 mg and 573 mg of sodium per 100 g (or per slice) respectively).

The analyses in this report also allowed for the conclusion that not many nutritional differences were observed between the various types of pizzas, which leads to the belief, as noted by the OQALI¹⁷, that this food category is relatively homogenous. Only pizzas with deli meats and vegetable pizzas stand apart from the others. In fact, pizzas with deli meats have higher calorie, fat and sodium contents than the other pizzas. By their very nature, deli meats like pepperoni are rich in fats and sodium, which may explain these observations. In 2010, the OQALI also noted that pizzas with deli meats had a higher sodium content than other pizzas.

Pizzas with deli meats have higher calorie, fat and sodium contents than the other pizzas.

According to this study, the fact of replacing deli meats with meat, or simply adding vegetables to pizzas with deli meats, seems to improve the overall nutritional profile of these pizzas (with vegetables maybe taking the place of some of the deli meats). In addition, reducing the cheese content or choosing a lower-fat and lower-sodium cheese

will result in reducing the saturated fat and sodium contents of pizzas. Furthermore, one study showed that a 25% reduction in cheese on pizzas offered on an American university campus did not result in a reduction in consumer appreciation²². As for vegetable pizzas, they have a lower carbohydrate, protein and sodium content, as was noted among the pizzas offered in France in 2010¹⁷. However, vegetable pizzas offered and sold in Canada have a higher sale price than other pizzas. In addition, vegetable pizzas have a thin crust more frequently, which may explain the lower carbohydrate content. The absence of meat and deli meats in these pizzas may also explain their lower protein and sodium content. Contrary to what was observed by the OQALI, cheese pizzas offered in Canada do not have higher fat, saturated fat or protein contents than the other pizzas¹⁷. While pizza crusts and pizza dough have seen a significant increase in sales in Québec in recent years⁷, pizzas with no toppings offered in Canada remain less numerous and have lower sales.

Using the 30% daily value threshold recommended by Health Canada (700 mg / 200 g of pizza), it can be observed that the majority of pizzas remain above this threshold for **saturated fats** (71%), and therefore, they may have to display a nutritional symbol on the front of their packaging. Considering that most pizzas contain cheese, deli meats and/or meat, it was to be expected that a large proportion of the offer would exceed this threshold. Many vegetable pizzas (with no meat or deli meats) (80%) also exceed this threshold, and none of the pizzas with no toppings exceed it, which means it may be the presence of cheese rather than the presence of meat or deli meats that explains the higher content of saturated fats. It

is also worth noting that the top sellers are frequently above the 30% daily value threshold. Pizzas with vegetables and meat (40%) and pizzas with no toppings (0%) exceed the threshold the least frequently.

The vast majority (94%) of pizzas exceed the recommended 30% daily value threshold for **sodium**. In addition, the large majority of pizzas also exceed the voluntary sodium reduction target (85%) established by Health Canada in 2012 (Step III target: 400 mg / 100 g of pizza). Meat pizzas and vegetable pizzas meet the Step III target (67% and 44% respectively) most frequently. With an average sodium content (weighted for sales) of 533 mg per 100 g of pizza, the pizzas offered in Canada have not attained the Step I target of 520 mg established by Health Canada⁴⁴. Once again, the presence of cheese, deli meats and tomato sauce may explain the excess sodium in these products.

The large majority of pizzas have a sodium content in excess of the 30% daily value threshold (94%) and the voluntary sodium reduction target (85%).

The wide variability of saturated fat and sodium contents within each of the classifications that were studied reveals that there is potential for improving the nutritional composition of pizzas sold in Canada.

Another aspect of this study was evaluating the **nutritional composition** of pizzas based on the **information presented on the packaging**, including the type of crust, sauce, target clientele and specific characteristics (Objective 2). Firstly, the nutritional composition of each product was evaluated as a function of the **type of crust**. These analyses suggest that thin-crust pizzas contain more saturated fats but less sugar and sodium than traditional-crust pizzas. It is possible that adding fats is necessary in order to produce a crispy crust. As for traditional-crust pizzas, they have a higher sodium content than thin-crust pizzas, and therefore, would benefit from a reduction in their sodium content. Sodium facilitates the formation of the gluten network, which helps the dough to rise. This may explain why these crusts contain more sodium than thin-crust pizzas. Pizzas with a calzone crust have higher calorie, fat, carbohydrate and sugar contents and lower protein and sodium contents compared to traditional-crust pizzas. Therefore, the focus should be on reducing the saturated fat content of thin-crust pizzas, reducing the sodium content of traditional-crust pizzas and reducing the sugar content of calzone-type pizzas. In 2010, the OQALI also noted that the differences observed among pizzas may be explained by the relative presence of the crust¹⁷. In addition, integrating whole wheat flour into the dough for the crust would increase the fibre content of pizzas. In fact, a study conducted among children revealed that their enjoyment of pizza was unchanged for crusts made with enriched flour or whole wheat flour³⁹.

The focus should be on reducing the saturated fat content of thin-crust pizzas, reducing the sodium content of traditional-crust pizzas and reducing the sugar content of calzone-type pizzas.

With respect to the **sauce**, pizzas with white sauce have a higher saturated fat content, as expected because of the presence of sour cream, cream cheese and/or additional cheese in their list of ingredients, and would benefit from a reduction in saturated fats. As for pizzas with rosé sauce, they have lower sugar and sodium contents than pizzas with tomato sauce, which have the highest sodium content (not a statistically significant difference). This is the expected result, because tomato sauces are widely recognized as contributing to the intake of sodium among Québécois⁵⁰. Therefore, since they represent the majority of sales by volume, a slight reduction in their sodium content could have a significant impact on public health, with no material effect on their taste.

Aside from the type of crust and the sauce, pizzas were also classified based on their **target clientele**. Pizzas targeted to children have higher calorie, carbohydrate and fibre contents and a lower saturated fat content. They are also less expensive than pizzas targeted to the general population. However, some of these associations become insignificant when the analyses are conducted using a multivariate model, because pizzas targeted to children are often of the calzone type (which have a higher calorie and carbohydrate content). Therefore, in adjusting for the other product attributes, pizzas targeted to children have a lower saturated fat content and higher fibre content. This is encouraging, considering the appetite for these types of products among children and teenagers^{2,12,18}. The two pizzas targeted to a health-conscious clientele did not have a different nutritional composition compared to those targeted to the general population. The fact of basing the sampling on sales may have contributed to this lower number of pizzas that are considered healthy, thus limiting the statistical power during analyses.

Pizzas targeted to children are often of the calzone type.

The nutritional composition of pizzas was also analyzed based on the **specific characteristics** of the products. This made it possible to conclude that pizzas that are considered to be authentic have a lower sugar content than basic pizzas (pizzas with no specific characteristics). The other attributes (e.g.: crust, target clientele) of the product do not appear to provide an explanation for this, because the difference in sugar content remains significant when using a multivariate model.

Additional analyses were undertaken with a view to examining the **sales breakdown** in connection with the nutritional composition of pizzas (Objective 3). First, it can be noted that, in addition to having higher sales volumes, pizzas with deli meats and vegetable pizzas appear most frequently among the 50 top-selling pizzas in kg. On the other hand, meat pizzas contribute less to fibre and sodium intakes, but more to sugar intakes compared to their sales, and calzone-style pizzas contribute strongly to sugar intakes compared to their sales volume.

The methodology that was used for the purposes of this study led to the creation of an overall portrait of the nutritional composition of the offer and sale of pizzas available in Canada. However, by sampling products based exclusively on sales, a diversity of niche products representing a small proportion of the market was not examined, and therefore, certain observations cannot be made. For example, organic or natural products and gluten-free pizzas were not part of the sampling.

7 Conclusion and perspectives

The analysis of the pizza category offered and sold in Canada led to the identification of possible avenues for improving the nutritional composition of the various classifications that were studied.

The first observation is that pizzas with deli meats are ranked highly in terms of diversity on grocery store shelves (number of different products offered). In addition, pizzas with deli meats on their own represent close to 35% of sales in this food category. These pizzas stand out negatively from the other pizzas offered on the market with higher fat and sodium contents. Reducing the amount of deli meats, adding vegetables or replacing some or all of the deli meats with meat (e.g.: chicken, strips of beef) would improve the nutritional composition of these pizzas. Considering their high sales volume, slight improvements may have a significant impact in terms of public health.

The large majority of pizzas exceed the 30% daily value thresholds for saturated fats and sodium. Despite this, the wide variability of saturated fat and sodium contents among the classifications and within each classification reveals that there is potential for improving the nutritional composition of pizzas offered in Canada. In fact, reducing the amount of cheese on pizzas by up to 25% and replacing a proportion of deli meats with vegetables would result in reducing both the saturated fat and sodium contents.

In addition to the type of pizza, the type of crust appears to be an indicator for the nutritional composition. In fact, traditional-crust pizzas would benefit from a reduction in sodium content, while thin-crust pizzas and calzones would benefit from a reduction in their saturated fat and sugar contents respectively. Furthermore, decreasing the amount of salt added to the crust and sauce would reduce the sodium content of pizzas. Finally, integrating some whole wheat flour into the crust would increase the fibre content of pizzas. Therefore, pizza processors and suppliers of crusts and ingredients should all be involved in reflections aimed at developing products that are lower in sodium and saturated fats.

In conclusion, this study led to the creation of a global portrait of the situation with respect to pizzas offered and sold in grocery stores in Canada in 2017. Working in collaboration with Health Canada, the methodology that was used can be used again in a few years to track the evolution of the nutritional composition of pizzas in Canada.

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Appendices

Table 7. Total contribution of pizzas by type over a period of 52 weeks

Type	Calories (millions)	Fats (kg)	Saturated fats (kg)	Carbohydrates (kg)	Fibre (kg)	Sugar (kg)	Protein (kg)	Sodium (kg)
Deli meats (n=48)	43 683 (36.7%)	1 794 775 (37.5%)	711 330 (38.1%)	5 083 752 (36.3%)	307 502 (36.1%)	605 936 (36.3%)	1 843 811 (36.5%)	104 577 (38.6%)
Vegetables and deli meats (n=35)	29 877 (25.1%)	1 135 926 (23.7%)	457 975 (24.5%)	3 626 035 (25.9%)	232 359 (27.3%)	410 432 (24.6%)	1 332 801 (26.4%)	70 855 (26.1%)
Vegetables (n=25)	14 510 (12.2%)	655 419 (13.7%)	222 478 (11.9%)	1 585 668 (11.3%)	109 089 (12.8%)	166 161 (10.0%)	528 624 (10.5%)	27 002 (10.0%)
Cheese only (n=20)	14 010 (11.8%)	589 416 (12.3%)	235 677 (12.6%)	1 663 099 (11.9%)	103 502 (12.2%)	226 022 (13.6%)	585 206 (11.6%)	31 273 (11.5%)
Vegetables and meat (n=15)	6 208 (5.2%)	212 316 (4.4%)	90 645 (4.9%)	790 326 (5.6%)	43 542 (5.1%)	97 223 (5.8%)	290 588 (5.7%)	13 151 (4.9%)
Meat and deli meats (n=6)	8 694 (7.3%)	333 043 (7.0%)	126 249 (6.8%)	992 641 (7.1%)	45 672 (5.4%)	123 099 (7.4%)	415 199 (8.2%)	20 705 (7.6%)
Meat (n=3)	1 208 (1.0%)	46 407 (1.0%)	22 267 (1.2%)	160 605 (1.1%)	5 871 (0.7%)	26 465 (1.6%)	39 981 (0.8%)	1 898 (0.7%)
No toppings (n=3)	748 (0.6%)	21 857 (0.5%)	1 551 (0.1%)	113 296 (0.8%)	3 336 (0.4%)	11 848 (0.7%)	20 831 (0.4%)	1 615 (0.6%)
Total (n=155)	118 937 (100%)	4 789 160 (100%)	1 868 172 (100%)	14 015 421 (100%)	850 874 (100%)	1 667 186 (100%)	5 057 042 (100%)	271 075 (100%)

- Information not shown

Table 8. Total contribution of pizzas by type of crust over a period of 52 weeks

Crust	Calories (millions)	Fats (kg)	Saturated fats (kg)	Carbohydrates (kg)	Fibre (kg)	Sugar (kg)	Protein (kg)	Sodium (kg)
Traditional (n=60)	57 695 (48.5%)	2 219 332 (46.3%)	893 977 (47.9%)	6 901 586 (49.2%)	362 797 (42.6%)	837 663 (50.2%)	2 615 134 (51.7%)	140 372 (51.8%)
Thin (n=65)	46 001 (38.7%)	1 893 110 (39.5%)	775 348 (41.5%)	5 214 398 (37.2%)	367 221 (43.2%)	516 775 (31.0%)	1 960 071 (38.8%)	100 227 (37.0%)
Calzone (n=30)	15 241 (12.8%)	676 718 (14.1%)	198 847 (10.6%)	1 899 437 (13.6%)	120 856 (14.2%)	312 748 (18.8%)	481 837 (9.5%)	30 476 (11.2%)
Total (n=155)	118 937 (100%)	4 789 160 (100%)	1 868 172 (100%)	14 015 421 (100%)	850 874 (100%)	1 667 186 (100%)	5 057 042 (100%)	271 075 (100%)

Table 9. Total contribution of pizzas by sauce over a period of 52 weeks

Sauce	Calories (millions)	Fats (kg)	Saturated fats (kg)	Carbohydrates (kg)	Fibre (kg)	Sugar (kg)	Protein (kg)	Sodium (kg)
Tomato (n=137)	110 254 (92.7%)	4 420 115 (92.3%)	1 715 639 (91.8%)	13 009 782 (92.8%)	802 964 (94.4%)	1 520 379 (91.2%)	4 722 439 (93.4%)	254 421 (93.9%)
Rosé (n=8)	4 599 (3.9%)	186 630 (3.9%)	76 116 (4.1%)	553 981 (4.0%)	29 913 (3.5%)	79 317 (4.8%)	172 042 (3.4%)	9 270 (3.4%)
White (n=7)	2 760 (2.3%)	115 917 (2.4%)	56 101 (3.0%)	309 982 (2.2%)	11 640 (1.4%)	45 516 (2.7%)	117 400 (2.3%)	5 317 (2.0%)
Other (n=3)	1 324 (1.1%)	66 497 (1.4%)	20 316 (1.1%)	141 676 (1.0%)	6 356 (0.7%)	21 974 (1.3%)	45 161 (0.9%)	2 068 (0.8%)
Total (n=155)	118 937 (100%)	4 789 159 (100%)	1 868 172 (100%)	14 015 421 (100%)	850 873 (100%)	1 667 186 (100%)	5 057 042 (100%)	271 076 (100%)

- Information not shown

Table 10. Total contribution of pizzas by target clientele over a period of 52 weeks

Target clientele	Calories (millions)	Fats (kg)	Saturated fats (kg)	Carbohydrates (kg)	Fibre (kg)	Sugar (kg)	Protein (kg)	Sodium (kg)
General population (n=132)	98 427 (82.8%)	3 947 178 (82.4%)	1 611 451 (86.3%)	11 515 085 (82.2%)	674 162 (79.2%)	1 321 310 (79.3%)	4 253 348 (84.1%)	224 956 (83.0%)
Children (n=21)	20 327 (17.1%)	836 409 (17.5%)	254 800 (13.6%)	2 474 033 (17.7%)	174 427 (20.5%)	341 134 (20.5%)	795 284 (15.7%)	45 796 (16.9%)
Health-conscious (n=2)	183 (0.2%)	5 572 (0.1%)	1 921 (0.1%)	26 303 (0.2%)	2 284 (0.3%)	4 742 (0.3%)	8 409 (0.2%)	324 (0.1%)
Total (n=155)	118 937 (100%)	4 789 159 (100%)	1 868 172 (100%)	14 015 421 (100%)	850 873 (100%)	1 667 186 (100%)	5 057 041 (100%)	271 076 (100%)

- Information not shown

Table 11. Total contribution of pizzas by specific characteristics over a period of 52 weeks

Specific characteristics	Calories (millions)	Fats (kg)	Saturated fats (kg)	Carbohydrates (kg)	Fibre (kg)	Sugar (kg)	Protein (kg)	Sodium (kg)
Basic (n=113)	102 368 (86.1%)	4 132 851 (86.3%)	1 618 933 (86.7%)	12 063 022 (86.1%)	733 832 (86.2%)	1 491 563 (89.5%)	4 322 457 (85.5%)	233 866 (86.3%)
Considered authentic (n=42)	16 569 (13.9%)	656 308 (13.7%)	249 239 (13.3%)	1 952 399 (13.9%)	117 041 (13.8%)	175 623 (10.5%)	734 584 (14.5%)	37 209 (13.7%)
Total (n=155)	118 937 (100%)	4 789 159 (100%)	1 868 172 (100%)	14 015 421 (100%)	850 873 (100%)	1 667 186 (100%)	5 057 041 (100%)	271 076 (100%)



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